NOTICE

All drawings located at the end of the document.

RF/RMRS-97-113

SAMPLING AND ANALYSIS PLAN TO SUPPORT THE GEOTECHNICAL EVALUATION OF THE TRENCH-1 TENT INSTALLATION

Rocky Mountain Remediation Services, L.L.C.

November 1997
Revision 0

TABLE OF CONTENTS

ACRONYMS

APO	Analytical Projects Office
ASTM	American Society for Testing Materials
IHSS	Individual Hazardous Substance Site
QA	Quality Assurance
QC	Quality Control
RFETS	Rocky Flats Environmental Technology Site
RIN	Report Identification number
SAP	Sampling and Analysis Plan
SOPs	Standard Operating Procedures

1.0 INTRODUCTION

This Sampling and Analysis Plan (SAP) was prepared to collect and analyze samples for a geotechnical evaluation of soils surrounding Trench-1 (T-1), Individual Hazardous Substance Site (IHSS) 108, at the Rocky Flats Environmental Technology Site (RFETS). The T-1 site is located north of Central Avenue, and east of the Protected Area fence (Figure 1-1). A subcontractor, Sprung Instant Structures Ltd. (Sprung), is expected to provide a temporary tent structure around the perimeter of T-1, including a limited support area (Figure 1-1). The subcontracted vendor requires information about soil characteristics so that the appropriateness of various footing/tie down options for the tent structure can be evaluated. Information provided by this plan will be used by Sprung engineers to evaluate footing/tie down options. The tent structure is expected to be erected in early 1998.

The footings/tie downs used for the tent structure will be placed in relatively undisturbed areas outside of the T-1 periphery. However, one exception may exist. One portion of the tent may be installed over the original Mound Site source removal excavation area. The Mound Site soils were treated to remove volatile organic compounds in 1997, and subsequently returned to the original Mound Site excavation. Therefore, these soils are expected to be disturbed. The decision of tent placement in this part of this trench is still being evaluated. The footings or tie downs are expected to be installed to a depth of approximately 7 feet. The areas outside of the actual trench (where the footing/tiedowns will be installed) are not expected to be contaminated with chemicals or radionuclides, other than the possibility of trace levels from the Mound Site.

Supplemental information on T-1 site history, chemical and radiological contamination, geology, and hydrogeology of the T-1 site are documented in various reports including the *Rocky Flats Environmental Technology Site Historical Release Report for the Rocky Flats Plant* (DOE, 1992); the *Phase II RFI/RI Report for Operable Unit No. 2* (DOE, 1995); the *Soil Vapor Survey Report for Operable Unit 2 Subsurface Interim Remedial Action* (EG&G, 1994); and the *Draft Trenches and Mound Site Characterization Report* (RMRS, 1996a).

2.0 SAMPLING AND DATA QUALITY OBJECTIVES

This sampling is being performed to collect data requested by the Subcontractor responsible for providing a portable tent structure to support the T-1 Source Removal Project. The analytical methods specified were required by the subcontractor to determine if the soil where the tent anchor system is expected to be installed is cohesive or cohesionless, and other geotechnical properties required for proper geotechnical evaluation. Because of the geotechnical objectives of the investigation, analytical/field quality assurance samples (e.g., duplicates, equipment rinsates and trip blanks) will not be required.

3.0 SAMPLE COLLECTION AND ANALYSIS

Samples will be collected in accordance with Geotechnical Procedure 5-21000-OPS, GT.2, Drilling and Sampling Using Hollow-Stem Auger Techniques. If necessary, radiological screening samples will be collected from the same interval/material used to for the bulk sample material described below (e.g., particle size distribution sample). Since the samples are not being collected to evaluate contaminants, decontamination between sampling locations is not required.

Five samples will be collected from the approximate locations identified on Figure 1-1. The samples will be collected from a depth of approximately 5-7 feet. Four of the sample locations are expected to be in relatively undisturbed Rocky Flats Alluvium, (Locations BH20197-BH20497). The fifth sample (Location BH205RM) is expected to come from the area previously excavated and treated from the Mound Site Source Removal Project. Table 3-1 lists the sample types, and corresponding sample container requirements.

Because of the coarse nature of the Rocky Flats Alluvium sample recovery problems are possible. The following discussion was prepared to address sample recovery issues. The most important parameter to get in an intact form is the bulk density of intact soil. With the bulk density identified, laboratory personnel will be able to "remold" un-intact soil to form a sample appropriate for the unconfined compressive strength testing. Though an intact sample for unconfined compressive strength would be ideal, it is not required (ASTM, D2166) and is not known if field conditions will permit its collection.

Shelby tubes will be evaluated for use in the field but are not anticipated to be strong enough to collect the "intact" samples. Intact samples [bulk density, soil moisture (same container as bulk

density) and if possible unconfined compressive strength] are expected to be collected with a 3" OD split spoon sampler containing approximately two 2.5" OD x 6" long brass liners. These samples will be capped immediately after collection to preserve the moisture content characteristics of the soil. The particle size distribution and Atterberg Limits (ASTM D 4318) samples are expected to come from the auger cuttings generated from an 8" solid stem auger. If intact sample recovery discussed above is a problem, the laboratory may use these cuttings and remold the samples for the unconfined compressive strength tests. The non-intact samples will be placed in a 5 gallon plastic bucket, or similar sample container.

The order of drilling and sample collection is expected as follows:

1) Each sample location will be augured to a depth of approximately 5' using an 8" solid stem auger.

2) The split spoon sampler will be advanced from approximately 5-7'. It is anticipated that the split spoon will be fitted with 2 sets of 6" brass tubes for advancement from 5-6' and then repeated from 6-7'.

3) The 8" solid stem auger will then be advanced from 5-7' and the cuttings containerized in a 5 gallon plastic can or equivalent for the non-intact samples. A composite from this material will be used for gross alpha/beta analysis used to evaluate this sample material with respect to the receiving facilities radioactive materials license.

4) If intact sample recovery is a problem, the split spoon sampler may again be advanced from 7-9' for collection of samples in brass tubes.

If conditions are encountered in the field which make the use of a procedure unsafe or inappropriate for the task at hand, the specified procedures may be modified or replaced as long as the modification or replacement procedure is justified and detailed in the field logbook, and the resulting data is comparable and adequate to meet the objectives of the project.

TABLE 3-1 T-1 GEOTECHNICAL SAMPLES

Analysis Method	Total Samples	Containers (Including Collection Combinations)
Density of Soil in Place by the Drive-Cylinder Method, ASTM D 2937	5	Shelby tubes will be evaluated in the field to get an intact sample, however it is expected that because of coarse texture of the soil this will not be possible. If not, 2.5" ID x 6" brass tubes will be used in conjunction with a split spoon sampler.
Standard Test Method for Laboratory Determination of Water (moisture) Content of Soil and Rock, ASTM D 2216	5	Same as above, sample may be combined with density sample.
Standard Test Method for Unconfined Compression Strength of Cohesive Soil, ASTM D 2166	5	Use of a Shelby tube or split spoon sampler is preferred. If sample appears to be cohesionless or recovery is a problem, sample can be collected by laboratory from cuttings contained in 5 gallon plastic drum discussed below.
Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils, ASTM D 4318 (3-inch to -200 sieve and hydrometer analysis)	5	Not a separate sample jar. Requires 150-200 grams of soil passing a 425-μm (No. 40) sieve. Samples will be collected by laboratory from material used in the particle size distribution test (D 422).
Standard Test Method for Particle-Size Analysis of Soils, ASTM D 422	5	Analysis requires approximately 5 kg (11 pounds). It is expected that this sample will be collected from cuttings generated by an 8" solid stem auger. The cuttings will then be placed in a 5 gallon plastic bucket (or equivalent).
Gross alpha/beta	5	2 ounce wide mouth container or equivalent

Samples being sent off-site for analyses will require evaluation under the U. S Department of Transportation's radioactive materials criteria of 2000 pCi/g, total radioactivity. In addition, requirements from the off-site laboratory's radioactive materials license will be complied with. Radiological field screening and gross alpha/beta analysis will be used to support the DOT evaluation and radioactive material license requirements of the receiving laboratory. The gross alpha/beta samples will be collected from the cuttings from the 5-7' horizon. Prior to shipment, a Property Release Evaluation will be obtained by Radiological Engineering.

In addition to the samples, the drill rig will require a Property Release Evaluation by Radiological Engineering prior to release from RFETS. After use the drill rig will be moved to the main decontamination facility and decontaminated in accordance with procedure FO.04, *Decontamination of Equipment at Decontamination Facilities*. A radiological survey will then

be performed in accordance with ROI-03.02, *Radiological Requirements for Unrestricted Release*, to support the issuance of a Property Release Evaluation by Radiological Engineering.

4.0 SAMPLE DESIGNATION

Each sample will be assigned a unique sample number in accordance with the RFETS, Analytical Projects Office (APO) requirements. The unique sample number will be broken down into three parts. The first part of the number will be the Report Identification Number (RIN) assigned by the APO. APO assigned RIN 98A0394 to this project. This RIN will be followed by a dash "-" and then the event number. The event number is a three digit code, starting with "001" and will be sequential. Each of the five discrete areas sampled will have their own event number and those will be 001-005. The event number will be followed by a period "." and then the sequential bottle number. The bottle number will be a three digit code starting with "001" and will be sequential under each event number. The bottle number will be used for different sample containers under the same location (same event number).

5.0 SAMPLING SUPPORT INFORMATION

This section describes the sample handling, documentation, and quality assurance requirements necessary to support the successful completion of this project. These geotechnical sampling activities will be conducted in accordance with the RMRS, Quality Assurance Program Plan (RMRS, 1995). The geotechnical samples will be handled in accordance with *Environmental Management Department (EMD) Operating Procedures Volume I, Field Operations 5-21000-OPS-FO.13, Containerization, Preserving, Handling, and Shipping of Soil and Water Samples*. Subsurface geological information will be documented on the Borehole Log Form (Form GT.1A) specified in GT.2, or equivalent. The originator shall authenticate (legibly sign and date) each completed hardcopy of field data. A peer reviewer, someone other than the originator, shall perform a peer review on each hardcopy of data. The peer reviewer shall authenticate (legibly sign and date) each hardcopy completed by the originator. Any modifications shall be lined-through, initialed, and dated by the reviewer (in ink).

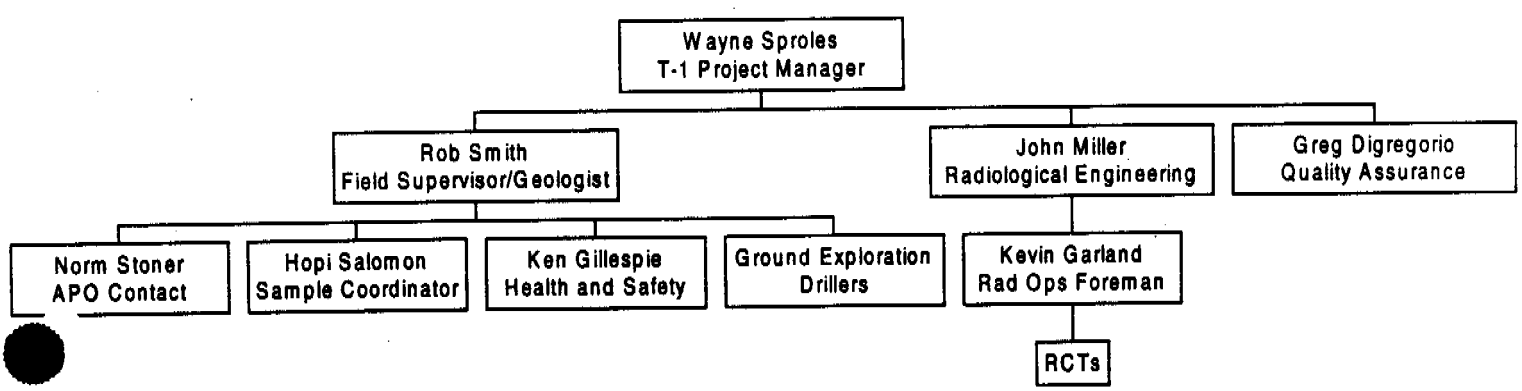
All activities will be conducted in accordance with the Activity Hazards Analysis Prepared for this job. Unanticipated hazards or conditions encountered during this project will be managed in accordance with this RMRS policy statement. "In the event unanticipated hazards or conditions

are encountered, the project activities will pause to assess the potential hazard or condition. The potential hazard or condition will be evaluated to determine the severity or significance of the hazard or condition. Based on this initial evaluation, a determination will be made whether to proceed with controls currently in place; segregate the hazard or condition from the project activity, if it can be done safely; or curtail operations to address the unexpected hazard or condition. Concurrence to proceed down the selected path must be obtained from the RMRS Vice President or their designee. In addition, the resumption of field activities involving radiological issues will be in accordance with Article 345 of the RFETS Radiological Control Manual." Note: "Unanticipated Hazards or Conditions" do not replace conditions which require emergency response, rather, they ensure that all work is performed based on an informed approach in regards to all potential hazards.

6.0 PROJECT ORGANIZATION

Figure 6-1 represents the organizational structure for this project. The Project Manager is responsible for ensuring that all data are collected, verified, transmitted and stored in a manner consistent with relevant operating procedures. The Field Supervisor/Geologist will be responsible for field data collection. Data management tasks will include completing all appropriate data management forms and completing the chain-of-custody form. The Sample Coordinator will obtain the appropriate RIN numbers and will coordinate sample shipment with APO personnel. The Sample Coordinator will also be responsible for verifying that the chains-of-custody are complete and accurate before the samples are shipped to the laboratory.

FIGURE 6-1
T-1 GEOTECHNICAL SAMPLING EFFORT
ORGANIZATIONAL STRUCTURE



7.0 REFERENCES

DOE, 1992, *Historical Release Report for the Rocky Flats Plant*, Rocky Flats Plant, Golden, CO.

DOE, 1995, *Phase II RFI/RI Report for Operable Unit No. 2.- 903 Pad, Mound, and East Trenches Area*, Rocky Flats Environmental Technology Site, Golden, CO..

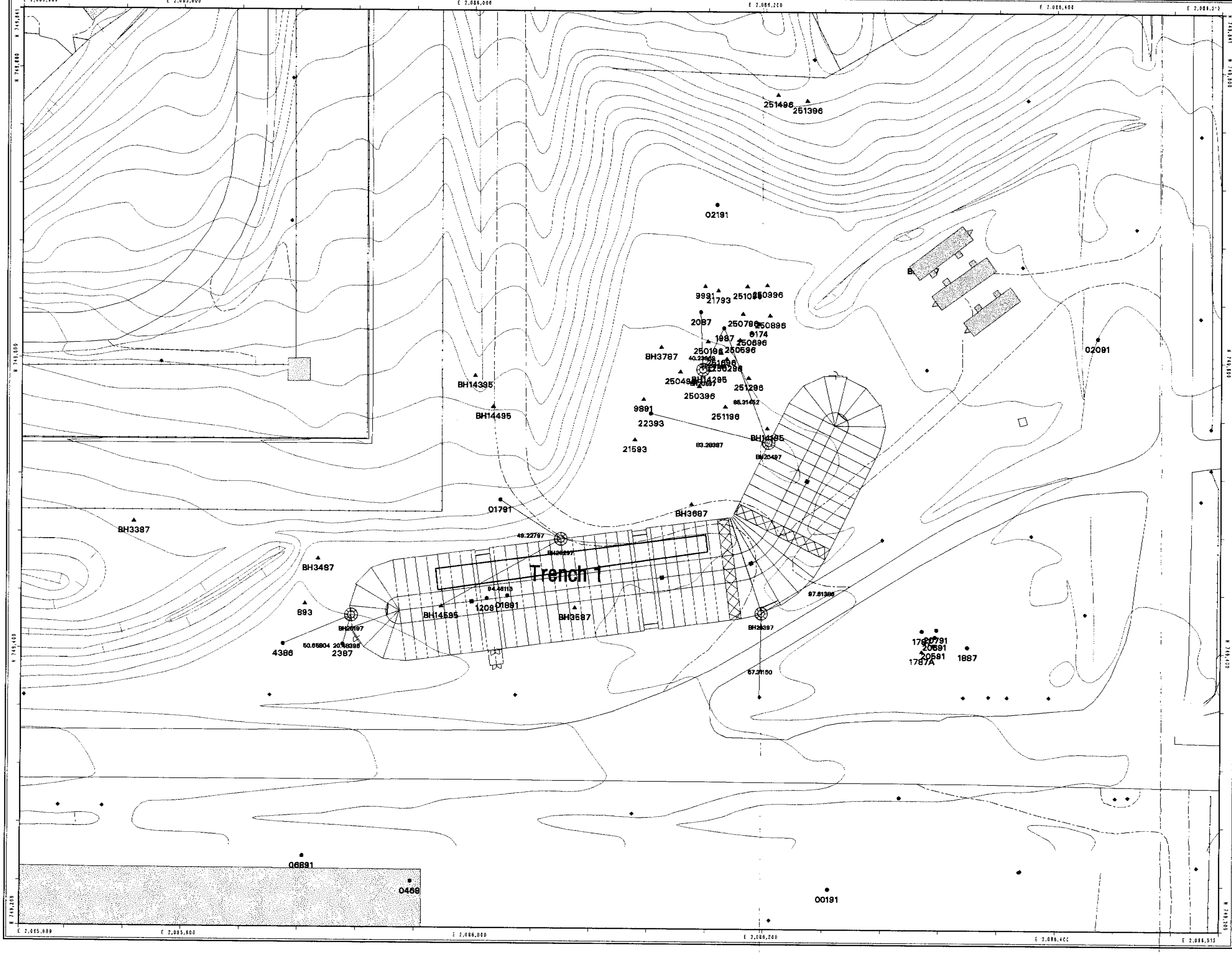
EG&G, Rocky Flats, Inc., 1994, *Soil Vapor Survey Report for the Operable Unit 2 Subsurface Interim Remedial Action*, January.

RMRS, 1995, *Quality Assurance Program Plan (QAPP)*. 95-QAPP-001. Golden, Colorado, October.

RMRS, 1996a, *Draft Trenches and Mound Site Characterization Report*, RF/ER-96-0044.UN, September.

Proposed Location of T-1 Tent Structure and Proposed Geotechnical Borehole Locations

Figure 1-1



EXPLANATION

- 2 Foot Contours
- Groundwater well Locations
- Power poles
- Borehole Locations
- Geotechnical Borehole Locations

Standard Map Features

- Buildings and other structures
- Lakes and ponds
- Streams, ditches, or other drainage features
- Fences and other barriers
- Paved roads
- Dirt roads

DATA SOURCE:
Buildings, fences, hydrography, roads and other structures from 1994 aerial fly-over data captured by EG&G RSL, Las Vegas. Digitized from the othophotographs. 1/95

Scale = 1 : 770
1 inch represents approximately 64 feet

25 0 50 100ft

State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27

U.S. Department of Energy
Rocky Flats Environmental Technology Site

Prepared by:
RMRS Rocky Mountain Remediation Services, L.L.C.
Geographic Information Systems Group
Rocky Flats Environmental Technology Site
P.O. Box 464
Golden, CO 80402-0464

MAP ID: 98-0025

November 13, 1997

/gis2/projects/fy98/98-0025/fant-t1-b.ami